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EFFECTS OF TOTAL SOLAR ECLIPSE ON MENTAL PATIENTS— A CLINICOBIOCHEMICAL CORRELATION

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SUMMARY

Thirteen treated psychotic cases comprising of eight schizophrenic, four M. D. P. (manic type) and one M. D. P. (depressive type), who were clinically symptom free, were studied in respect of their hormones and behavioural abnormalities under effect of total solar eclipse. Of the hormones studied viz., T_3, T_4, TSH, cortisol and proclactin, it is prolactin which showed an increase in titre associated with behavioural abnormalities in concerned patients during and immediately after the total solar eclipse. Deflection in both prolactin and behaviour gradually seemed to normalise over the post eclipse period.

OBJECT OF STUDY

Natural phenomena have been working as some of the most important influencing factors on behaviour of animals and particularly on that of human beings. Not only the external manifest behaviour but also the internal homeostasis is likely to be affected in order to produce change for adaptation to the natural setting. Eclipses have long been associated with human behaviour. The total solar eclipse—a rare phenomenon, occurring once in a century or so, at a particular place occurred in various parts of India on 16th February, 1980. The authors were keenly interested in the likely effects that the total solar eclipse might produce on the behaviour and circulating hormones in blood of psychiatric patients receiving indoor treatment under their care. The idea was to note behavioural changes and hormonal changes, if at all, in the mental patients (though with normal behaviour and normal blood hormone level following treatment) due to solar eclipse and correlate the detected behavioural abnormality with the detected hormonal abnormality to explain how the internal milieu and external manifest behaviour change hand in hand in response to a rare natural phenomenon.

MATERIALS AND METHODS

Thirteen treated psychotic cases were selected from the indoor patients of an institution. Of them eight were schizophrenics (3 males & 5 females), four were cases of manic depressive psychosis (manic type—3 males & 1 female) and one female was a case of manic depressive psychosis (depressive type). These patients were doing well at the time of the study with treatment given to them. Hence their behaviour was noted to be normal in all respects before blood samples were collected for these studies. Presence of any other physical disease during the study was excluded by a thorough clinical examination. Six days before the eclipse blood samples from each of these patients were collected twice daily—once at 13.00 hrs and other at 17.00 hrs for estimation of circulating levels of T_3, T_4, TSH, Prolactin and Cortisol. Further, a chart of behaviour for every patient was maintained daily over this

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period of six days. On the day of eclipse blood samples were collected from each patient during the total solar eclipse and just after the eclipse, similarly blood sample was also taken daily during six days after the eclipse at the same time. Behaviour of the patients were charted during the total eclipse, when eclipse was over and in the following six days. Estimation of T_3, T_4, TSH, Prolactin and Cortisol from all sets of samples of each patient was done and results tabulated. Changes in hormonal levels beyond normal were noted. Behavioural changes during the eclipse and during the six post-eclipse days in each case were also noted carefully. Behavioural changes observed during eclipse were matched with changes in blood hormone levels of patients to draw conclusion that the only variable total solar eclipse, in this study as possibly responsible for the change in behaviour as well as the blood hormones of the patients.

RESULTS AND DISCUSSION AND CLINICO-BIOCHEMICAL CORRELATION

Patients have been arranged with serial No. 1-13. Patients bearing serial No. 1-5 were female schizophrenics ; serial No. 6-8 were male schizophrenics ; serial No. 9 was a female manic depressive (manic type) ; serial No. 10-12 were male manic depressive (manic type) and serial No. 13 was a female manic depressive (depressed type).

During the pre-eclipse days all these patients were observed to be having normal behaviour and their blood samples showed levels of T_3, T_4, TSH, Prolactin and Cortisol within normal limits. However treatment of every patient was being continued.

Table I shows the values of T_3, T_4, TSH Prolactin and Cortisol of patients No. 1, 4, 6, 11, 12 & 13 with behavioural changes marked in them. In rest of the patients the values of these hormones remained within normal limits and no detectable behavioural change was observed and they have not been included in this Table.

The Table also shows that during eclipse patients No. 1 and 12 were anxious and restless. Patient No. 6 showed self-muttering and patients No. 4, 11 and 13 had anxiety as well. Out of these cases patients No. 4, 11, 12 & 13 shows higher prolactin level..

From Table II it can be observed that in all these cases levels of prolactin seems to have attained significantly higher titre and symptoms and abnormaltiy in their behaviour have also become more pronounced.

TABLE I—*Biochemical and clinical findings during total Eclipse*

Patient No.	BIOCHEMICAL FINDINGS					CLINICAL FINDINGS			
	T_3 ng/ml.	T_4 ng/ml.	TSH U/ml.	Prolac-tin ng/ml.	Corti-sol mol/ml.	Restless ness	Anixety	Irre-levant talk	Self-mutter-ing
1	1.30	70.00	1.00	3.70	393.00	+	+	—	—
4	1.20	80.00	4.00	22.90	355.00	—	+	—	—
6	1.20	60.00	3.90	11.80	399.00	—	—	—	+
11	1.30	77.00	1.00	19.80	395..00	—	+	—	—
12	0.95	55.00	4.80	21.10	315.00	+	+	—	—
13	1.00	63.00	1.00	18.70	430.00	—	+	—	—

TABLE II—*Biochemical findings and Clinical findings just after Eclipse*

Patient No.	BIOCHEMICAL FINDINGS and CLINICAL FINDINGS								
	T_3 ng/ml.	T_4 ng/ml.	TSH U/ml.	Prolactin ng/ml.	Cortisol Mol/ml.	Restlessness	Anxiety	Irrelevant talk	Self-muttering
1	1.60	80.00	1.00	21.20	310.00	+	+	—	—
4	1.70	100.00	1.00	35.40	334.00	+	+	—	—
6	1.40	68.00	4.30	31.70	396.00	+	—	+	+
11	1.80	100.00	1.00	32.40	312.00	+	+	—	—
12	1.00	62.00	6.00	40.50	455.00	+	+	—	—
13	1.15	60.00	3.80	35.60	350.00	+	+	+	—

TABLE III—*Biochemical findings and Clinical findings over Six Post Eclipse Days*

Patient No.	BIOCHEMICAL FINDINGS (MEAN OF SIX DAYS)					CLINICAL FINDINGS				
	T_3 ng/ml.	T_4 ng/ml.	TSH U/ml.	Prolactin ng/ml.	Cortisol Mol/ml.	Sleep disturbance	Restlessness	Anxiety	Irrelevant talk	Self-muttering
1	1.19	71.01	1.17	3.97	372.87	+	+	+	—	—
4	1.67	77.19	3.42	10.92	356.78	+	+	+	+	—
6	1.34	54.82	5.98	11.77	299.37	+	+	—	+	+
11	1.17	70.07	1.39	11.02	447.81	+	+	+	—	—
12	1.07	52.95	6.13	13.99	339.10	+	+	+	—	—
13	1.01	59.99	4.95	9.78	351.13	+	+	+	+	—

From Table III we find that over the six post eclipse days the previously increased titre of prolactin shows a tendency to come down gradually to the normal and behavioural abnormalities and symptoms like sleep disturbance, restlesness and anxiety were seen in patients No. 1, 4, 11, 12 & 13 ; sleep disturbance, restlessness, irrelevant talk and self-muttering were found in patient No. 6 and irrelevant talk was found in patient No. 13. But these behavioural abnormalities were observed to start reducing in intensity gradually to become absent over the six post eclipse days in the same pace as prolactin level normalised over the same period.

On the whole during the study we have been impressed with increased prolactin level in all patients who showed behavioural abnormalities. Other hormones tended to register titre within normal limits.

From Table IV we are impressed that prolactin level which was within normal range during pre-eclipse days tended show-

TABLE IV—*Comparative Statement of Prolactin Levels (ng/ml·)*

Case no.	Pre-Eclipse (Mean of 6 days)	During total Eclipse	Just after Eclipse	Six Post Eclipse Days (Mean)
1	4.63	3.70	21.20	3.97
4	11.50	22.90	35.40	10.92
6	11.16	11.80	31.70	11.77
11	10.48	19.80	32.40	11.02
12	14.88	21.10	40.50	13.99
13	8.91	18.70	35.60	9.78

ing an increase during eclipse, markedly found increased just after the eclipse and tended to gradually decrease over the six post eclipse days.

CONCLUSION

On the whole the fluctuations of titre of prolactin during and just after the total eclipse are quite marked and seem to have a bearing on the behavioural changes which occurred among patients having raised prolactin level as can be appreciated from Table-II. Naturally, one can presume that prolactin has some causative link with the genesis of behavioural changes. It was well marked by Zacur *et al.* (1976) that rise of prolactin level precipitates both mental and physical changes. Yen *et al.* (1976) suggested that psychosomatic diseases may be precipitated by prolactin secreting adenomas. Findings of this study support the recent use of Bromocriptin for treatment of manic depressive psychosis since Bromocriptin is a known prolactin suppressing agent. From the Table it can be condluded that prolactin has altered significantly in only those who have shown behavioural changes. It is worthwhile to study prolactin in each and every cases of schizophrenia as well as M. D. P.

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